IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Sharon LIU et al.
Serial No.: 10/696,081
Filed: October 29, 2003

Group Art Unit: 2128
Examiner: D. Silver
Confirmation No.: 5946

For: ADJOINT-BASED GRADIENT DRIVEN METHOD FOR IDENTIFYING UNKOWN PARAMETERS OF NON-LINEAR SYSTEM MODELS

Docket No.: GP-302997

ARGUMENTS ACCOMPANYING PRE-APPEAL BRIEF REQUEST FOR REVIEW

I. Status of Claims

Claims 22-27 and 29 are now pending in this application, with Claim 22 being the independent claims.

II. Rejections Under 35 U.S.C. § 102

Claim 22 is rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by the publication entitled "Evaluation of Turbocharger Power Assist System Using Optimal Control Techniques," authored by Ilya Kolmanovsky (hereinafter Kolmanovsky).

Kolmanovsky relates to a method for finding an optimal control input trajectory for a setpoint performance target in minimum time for a turbo diesel engine. The input trajectory is described mathematically as a set of linear B-splines. However, because the control input trajectory is unknown, the coefficients of the equation are also unknown. Various tools, such as Mathworks features SQP, explicit gradient computations, and "constr.m" are used to find the co-efficients of the scalar linear splines equation computationally, such that the equation describes ONE scalar time varying engine power input trajectory needed to achieve ONE

constant target performance setpoint engine speed, in minimum time, using minimum energy for a deterministic model of a turbo diesel engine.

Upon close review and study of Kolmanovsky, it is noted that this article fails to disclose, or even remotely suggest, at least three steps of the method defined by independent Claim 22. Namely, Kolmanovsky fails to disclose at least: (1) determining an adjoint identity from the governing state equation for the powertrain system; (2) determining a perturbation cost function based at least in part on the determined adjoint equation, the determined perturbation state equation, and the determined adjoint identity; and (3) determining a gradient based at least in part on the determined adjoint equation.

The final Office action alleges that Kolmanovsky discloses determining an adjoint identity from the governing state equation, and determining a gradient based at least in part on the determined adjoint equation at page 5, col. 1, paragraph 2, and determining a perturbation cost function based at least in part on the determined adjoint equation, the determined perturbation state equation, and the determined adjoint identity at page 2, col. 2, paragraph 1 (final Office action at 4). It is noted that page 5, col. 1, paragraph 2 of Kolmanovsky merely discloses that the above-mentioned Mathworks features, including SQP, explicit gradient computations, and constr.m, were used to find the co-efficients of the scalar linear splines equation. Absolutely nowhere does this portion of Kolmanovsky even remotely disclose or suggest determining an adjoint identity from the governing state equation, or determining a gradient based at least in part on the determined adjoint equation. Moreover, page 2, col. 2, paragraph 1 of Kolmanovsky discloses absolutely nothing regarding determining a perturbation cost function based at least in part on the determined adjoint equation, the determined perturbation state equation, and the determined adjoint identity.

In view of the foregoing, reconsideration and withdrawal of the § 102 rejection of Claim 22 is requested.

III. Rejections under 35 U.S.C. § 103

Claims 22-27 and 29 stand rejected under 35 U.S.C. § 103 as being unpatentable over a publication entitled "Adjoint and Raccati: Essential tools in the analysis and control of transitional and turbulent flow systems," authored by Thomas R. Bewley et al. (Bewley et al.) and Kolmanovsky.

The shortcomings of Kolmanovsky have already been pointed out. As regards Bewley et al., this citation discloses multiple-input-multiple-output (MIMO) nonlinear control input, output estimation, and output prediction using an adjoint gradient algorithm that is quick & efficient for computational fluid dynamics (CFD). More specifically, Bewley et al. are concerned only with control input and output estimation, or output signal prediction, given one initial condition. Applicant submits that it is clear that Bewley et al. do not disclose, or even remotely suggest, the methodology defined by at least independent Claim 22.

The final Office action cites various slides as disclosing the method; however, when the final Office action is reviewed it is clear that the analysis included therein is faulty. For example, the final Office action cites slides 18, 5, 10, and 26 of Bewley et al. as disclosing the step of determining a perturbation cost function based at least in part on the determined adjoint equation, the determined perturbation state equation, and the determined adjoint identity (final Office action at page 5). Upon review of these slides it is seen that these slides disclose: (1) the adjoint identity (slide 18); (2) a state equation, a perturbation equation, and a cost function (slide 5); (3) how a control solution can be found from a defined state equation and a perturbation equation (slide 10); and (4) implementation of Fourier-space compensators (slide 26). Nonetheless, Applicant submits that these slides can be placed side-by-side and will never disclose, or even remotely suggest, determining a perturbation cost function based at least in part on the determined adjoint equation, the determined perturbation state equation, and the determined adjoint identity.

In view of the foregoing, reconsideration and withdrawal of the § 103 rejection of Claims 22-27 and 29 is requested.

IV. Conclusion

In view of the foregoing, it is submitted that Kolmanovsky does not support rejection of independent Claim 22 under 35 U.S.C. § 102(b), and the combination of Kolmanovsky and Bewley et al. does not support rejection of Claims 22-27 and 29 under 35 U.S.C. § 103. As such, Applicants request that the reviewing panel find that the present application is in condition for allowance.

If for some reason Applicant has not paid a sufficient fee for this response, please consider this as authorization to charge Ingrassia, Fisher & Lorenz, Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

Dated: April 18, 2007

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